Perspective

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Regard to the Physical Interconnection of the Devices

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Description

Network topology is the arrangement of the elements of a communication network. Network topology can be used to define or describe the arrangement of various types of telecommunication networks, including command and control radio networks industrial field busses and computer networks. Network topology is the topological structure of a network and may be depicted physically or logically. It is an application of graph theory wherein communicating devices are modelled as nodes and the connections between the devices are modelled as links or lines between the nodes. Physical topology is the placement of the various components of a network, device location and cable installation), while logical topology illustrates how data flows within a network.

Logical Topologies

Distances between nodes, physical interconnections, transmission rates, or signal types may differ between two different networks, yet their logical topologies may be identical. A network's physical topology is a particular concern of the physical layer of the OSI model. Examples of network topologies are found in Local Area Networks (LAN), a common computer network installation. Any given node in the LAN has one or more physical links to other devices in the network; graphically mapping these links results in a geometric shape that can be used to describe the physical topology of the network. A wide variety of physical topologies have been used in LANs, including ring, bus, mesh and star. Conversely, mapping the data flow between the components determines the logical topology of the network. In comparison, Controller Area Networks, common in vehicles, are primarily distributed control system networks of one or more controllers interconnected with sensors and actuators over, invariably, a physical bus topology the transmission medium layout used to link devices is the physical topology of the network. For conductive or fiber optical mediums, this refers to the layout of cabling, the locations of nodes and the links between the nodes and the cabling. The physical topology of a network is determined by the capabilities of the network access devices and media, the level of control or fault tolerance desired and the cost associated with cabling or telecommunication circuits.

Post Communications

In contrast, logical topology is the way that the signals act on the network media, or the way that the data passes through the network from one device to the next without regard to the physical interconnection of the devices. A network's logical topology is not necessarily the same as its physical topology. For example, the original twisted pair Ethernet using repeater hubs was a logical bus topology carried on a physical star topology. Token Ring is a logical ring topology, but is wired as a physical star from the media access unit. Physically, AFDX can be a cascaded star topology of multiple dual redundant Ethernet switches; however, the AFDX Virtual links are modelled as time-switched single-transmitter bus connections, thus following the safety model of a single-transmitter bus topology previously used in aircraft. Logical topologies are often closely associated with media access control methods and protocols. Some networks are able to dynamically change their logical topology through configuration changes to their routers and switches. Under the Bell System monopoly post Communications Act of 1934.

In Integrated Circuits (ICs), interconnects are structures that connect two or more circuit elements such as transistors together electrically. The design and layout of interconnects on an IC is vital to its proper function, performance, power efficiency, reliability and fabrication yield. The material interconnects are made from depends on many factor. Chemical and mechanical compatibility with the semiconductor substrate and the dielectric between the levels of interconnect is necessary, otherwise barrier layers are needed. Suitability for fabrication is also required; some chemistries and processes prevent the integration of materials and unit processes into a larger technology (recipe) for IC fabrication. In fabrication, interconnects are formed during the back-end-of-line after the fabrication of the transistors on the substrate. Interconnects are classified as local or global interconnects depending on the signal propagation distance it is able to support. The width and thickness of the interconnect, as well as the material from which it is made, are some of the significant factors that determine the distance a signal may propagate. Local interconnects connect circuit elements that are very close together, such as transistors separated by ten or so other contiguously laid out transistors. Global interconnects can transmit further, such as over large-area sub-circuits. Consequently, local interconnects may be formed from materials with relatively high electrical resistivity such as polycrystalline silicon may reach, various circuits such as buffers or restorers may be inserted at various points along a long interconnect, which allowed some non-bell owned equipment to be connected to the network and was followed by a number of other cases, regulatory decisions and legislation that led to the transformation of the American long distance telephone industry from a monopoly to a competitive business. This further changed in FCC's Carter one decision in 1968, which required the Bell System companies to permit interconnection by radio-telephone operators today the standard electrical connector for interconnection in the US and much of the world, is the registered jack family of standards, especially RJ11.